ERIC Documents Resume	See Instruction Sheet	DATE OF RESUME	DATE RECEIVED

A. PUBLICATION DATA

1. ERIC NUMBER	2. ORIGINATOR CONTROL NO(S).	3. IDENTIFICATION NO.
ED001909	N.A.	N.A.

DO NOT WRITE IN SPACE BELOW

4. AUTHOR(S):
Houston Independent School District

5. TITLE OF DOCUMENT ABSTRACTED:
Course Outline for First Six Weeks for Science-Level II Talent Preservation Classes

6. PUBLICATION TITLE:
N.A.

7. EDITOR(S):
N.A.

8. PLACE OF ORIGIN
Houston Independent School District
ORG.
ST. Houston, Texas
CITY, STATE
TELE. EXT.
INST/LOC CODE

9. PUBLISHER OR SOURCE
Houston Independent School District
Houston, Texas

10. VOL.	11. PAGES	12. MO./YR.	13. TOTAL PP.
N.A.	N.A.	8/64	28

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TYPE OF REPORT
PROPOSAL ☐
IN-PROGRESS ☐
FINAL ☐
FOLLOW-UP ☐

OTHER ERIC REFERENCES:

ERIC SATELLITE CODE

B. INDEXING DATA

14. SUBJECT AREA

15. TYPE OF ENDEAVOR
course outline

16. INDEXING TERMS (6-12)

science	disease	Houston Independent School District		
animal life		Houston, Texas		
human body		Talent Preservation		

17. ABSTRACT (MAX. 250 WORDS)

The first six week unit concerns animal life, and topics include protozoa, invertebrates, and vertebrates. Unit II, "The Human Body", includes body systems health, and safety. Textbook references, content outline, teaching suggestions, reference readings, and audiovisual aids are given under each topic.

It is suggested that first experiences with the class be conducted on a discussion basis, with the teacher as the main reference point. One should avoid audiovisual aids and other resources at this time. The use of library materials should eventually be part of the program. Also, the teacher should have students develop word lists for each topic. Another suggestion is that study of the higher invertebrates be covered through pupil projects, with students following report-forms. Since many students may drop out of school at the end of the year, it is important that basic understanding of disease be emphasized under the health and safety topic.

ERIC No.

18. SOURCE OF ABSTRACT

C. FUNDING DATA

19. SUPPORTING ORGANIZATION	20. DIVISION OR DEPT.	21. CONTRACT NO. / PROJECT NO.
	22. TOTAL COST OF PROJECT	
	23. DURATION OF PROJECT	U.S. Department of Health, Education, and Welfare Office of Education

ED001909

COURSE OUTLINE

for

FIRST SIX WEEKS

of

SCIENCE - LEVEL II

TALENT PRESERVATION CLASSES

Houston Independent School District

Houston, Texas

August 1964

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U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
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LEVEL TWO

UNIT I: ANIMAL LIFE (Approximately six weeks)

TOPIC 1: PROTOZOA

Textbook References

Living Things, pages 120-126.
Adventures In Science, pages 320-321.
Science 2, pages 255-264.

Library Materials

Describe your class library. Coordinate with other teachers in use of the school library. Refer to Reference Readings at end of each topic. Urge use of public libraries, newspapers, etc.

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Content

A. Hay infusion

B. The seven life functions

1. Growth
2. Sensitivity
3. Respiration
4. Food-getting
5. Excretion
6. Digestion
7. Reproduction

C. Protozoa and disease

1. Bleeding gums—pyorrhea
2. Dysentery
3. Malaria

D. The student's notebook—
Suggested organization:

1. Unit I
   a. Classwork
   b. Activities

Suggestions

Protozoa are used as a beginning topic because the average citizen knows so little about them. It can become a vivid lesson on the fact that there is more to nature than meets the eye. Emphasize that protozoa exist just about anywhere man goes in nature. A handful of dead grass off the lawn, placed in a mayonaise jar and covered with water—rain water is best—will make a good hay infusion. Urge that the students prepare these at home (the first day of school if possible) and indicate that those who prepare them will be able to look forward to use of the microscope. Make it clear that apparatus will be available only in connection with active projects.

Introduce the seven life functions in relation to the word "culture." Expand on the fact that a culture of living things is a situation in which all of these functions exist, and that when one of these stops, the end of the culture is imminent.

Make your first experiences with the class on a discussion basis, bearing in mind that the seven life functions will be reconsidered over and over again throughout the course; but for the present, stick to protozoa. Avoid audio-visual aids and other resources at this time; let yourself be the main reference point.

c. Test papers
d. Project reports

2. Unit II
Same order

E. Animal cell structures

1. Cell membrane

2. Nucleus

3. Cytoplasm

4. Cilia and flagella

F. How to use the textbook

1. Index

2. Table of contents

3. Glossary

4. Review questions

G. Research projects

1. Make book reports

2. Make posters

3. Write papers

4. Experiments—such as a comparison of bayou, rain, and city water cultures

5. Make free-hand drawings

6. Collect pictures and articles from old reading material

H. Conditions for life

1. Food

2. Heat

3. Oxygen

4. Water

Describe how unbrushed teeth make a good culture medium for amebas (Endamoeba gingivalis—pyorrhea), how the intestines make a good medium for dysentery amebas (Endamoeba hystolytica), and how red blood cells are good mediums for malaria-causing protozoa (Plasmodium vivex). Draw parallels between the names of protozoa, diseased organs, and the disease itself—by viewing prefixes. Be graphic—even sensational—in your descriptions of specific encounters with such diseases.

Conduct the first supervised study on organizing the notebook and entering the first basic diagrams in the classwork section: ameba and paramecium. Reproduce a list of questions to which answers may be found by reference to the textbook index. Don't lecture on the use of the index; let the students discover their need for such skill. Allow those who have developed such skill to help those without it, thus encouraging leadership and cooperation to emerge. This first supervised study will give you a chance to evaluate your success in setting the students into motion. Encourage individual initiative but provide close and careful supervision wherever needed.

Try to complete the study of sub-topics A through F before using audio-visual aids and microscopes. Let anticipation build for the day when they can actually see protozoa.

Emphasize order: provide for regular assigned seating (except for project work), require neat and orderly notebooks, and stress the need for bringing the textbook and notebook to class each day.

Try to steer projects in the direction of finding answers to questions such as:

1. Why and how does the city purify water?

2. How do protozoa reproduce?

3. What are the conditions necessary for life?

4. What distinguishes animals from plants?

5. How do protozoa employ the seven life functions?

I. The microscope

J. The stock room

K. Laboratory procedures

L. Word list—important terms

1. Adaptation
2. Environment
3. Biology
4. Culture

Once a discussion gets going, don't bring it to a premature halt, just to keep up with lesson plans. Often, the motivation that is required for project work will grow out of pertinent discussion developed in class.

Emphasize that the way to prevent life—either helpful or harmful—is to remove one or more of the conditions for life. This is how to control protozoa at home and on the body.

Have each student develop a word list for each topic including all new and important words. Cooperate with other Talent Preservation teachers in the use of these lists. Conduct your summary of each topic with special regard for important new words that will become necessary tools in units that follow.

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Reference Readings

Cosgrove, Margaret. Wonders Under a Microscope. Dodd, Mead, and Company, 1959.

_____. Strange World Under a Microscope. Dodd, Mead, and Company, 1962.

Yates, Raymond F. Fun With Your Microscope. Appleton-Century-Crofts, Inc, 1943.

Lewis, Lucia Z. The First Book of Microbes. Franklin Watts, Inc.

Ludovici, L.J. The World of the Microscope. G.P. Putnam's Sons.

Moon, Truman J., Paul B. Mann, and James H. Otto. Modern Biology. Henry Holt Company, Inc., 1951.

"Microscope." The Book of Knowledge. Vol. 8, p. 2681.

"Microbes." The Book of Knowledge. Vol. 2, p. 661.

Leonard, Johnathan N. "Microorganism." Exploring Science. pp. 233-241.

"Amoeba." The Encyclopedia Americana. American Corporation.

Curtis, Francis D., and George G. Mallinson. Science in Daily Life. Ginn and Company, 1958.

Gray, William S. "The Lens Maker of Delft." Wonders and Workers. Scott, Goresman, and Company, p. 340.

Asimov, Isaac. Break Through in Science. Houghton Mifflin Company, 1960.

"Pyorrhea," "Protozoa," "Paramecium." World Book. Field Enterprises, Vol. P.

"Ameba." World Book. Field Enterprises, Vol. A.

Stehli, Dr. George. The Microscope and How to Use It.

Disraeli, Robert. New Worlds Through the Microscope.

Schwartz, Julius. Through the Magnifying Glass.

Audio-visual Aids

Films

1683	Asexual Reproduction....10 min.	1076	Miracle of Life.....10 min.
450	Cell, The: Structural Unit of Life.....10 min.	1394	Scientific Method.....11 min.
M2318	Life in a Cell.....C..14 min.	353	What Is Science.....11 min.
410	Life in a Drop of Water.....C..11 min.	M1156	Introduction to Biology.....14 min.
M2440	Microbes and Their Control.....C..13 min.		
M1854	Microscopic Life.....14 min.		

Filmstrips

Fs-728 Small Fresh Water Animals and Insects

Transparencies

Tr-1016 Protozoans

Adopted Textbooks

Fitzpatrick, Frederick P., and Thomas D. Bain. Living Things. New York: Henry Holt and Company, 1958.

Jacobson, Willard J., Robert N. King, and Louise E. Killie. Adventures in Science 7. New York: American Book Company, 1959.

Davis, Ira C., John Burnett, and E. Wayne Gross. Science 2: Experiment and Discovery. New York: Henry Holt and Company, 1958.

TOPIC 2: INVERTEBRATES

Textbook References

Living Things, pages 330-334; 126-153; expanded reading, pages 1-46; 384-393.
Adventures In Science, pages 322-327; expanded reading, pages 281-293.
Science 2, pages 233-255; 277-308; expanded reading, pages 1-13; 265-276.

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Content	Suggestions
A. Broad animal classification 1. Vertebrates 2. Invertebrates	Point out that there are several ways of classifying animals. Here, the criterion is the presence or absence of a backbone. Assign a group project to pursue the binomial system of classification and report to the class.
B. Kinds of reproduction 1. Asexual 2. Sexual	Relate asexual reproduction to the survival of protozoa (fission), tissue-forming cells in the process of growth (mitosis), and extend the culture concept to a tissue within an organ, an organ within a body system, and a body system within the animal body itself. This can be extended further into some study of animal ecology and natural history—adaptation, protection, migration, and hibernation.
C. Division of labor 1. Cells in a tissue 2. Tissues in an organ 3. Organs in a body system 4. Body systems in the body	Discuss how every animal has its own unique technique for survival...survival of the fittest.
D. Survival of the fittest 1. Individuals 2. Species	Explain that sexual reproduction (cell fusion) becomes more common among higher animals, and helps account for their survival by supporting family formation. As an agent for educating offspring—in making them contemporary with the parents—the family does much to prevent retrogression of the species; furthermore, it provides a new plateau from which the new generation can advance the cause of survival. Sexual reproduction, then, not only satisfies the need for survival of individual traits, but it is implicit in complex animal societies as a factor for survival of the species. Unfit species become extinct...with unsuccessful reproduction.
E. Animal societies 1. Working together in common cause for: a. Getting food b. Protection c. Reproduction	

2. Division of labor
   a. Male — female
   b. Ants
   c. Bees
   d. Men

3. Competing societies
   a. Natural enemies
   b. Causes for survival
      (1) Food
      (2) Protection

4. Control of environment
   a. The beaver
   b. Mold—antibiotics
   c. Man—heating, air conditioning, clothes, laws

F. Lower invertebrates

1. Protozoa

2. Sponges

3. Hydra

4. Jellyfish

5. Corals

G. Higher invertebrates

1. Mollusks
   a. Clams
   b. Oysters
   c. Scallops
   d. Snails
   e. Squid
   f. Octopus

2. Echinoderms
   a. Starfish
   b. Sand dollar
   c. Sea cucumber
   d. Sea urchin

3. Flatworms
   a. Planaria
   b. Liver flukes
   c. Tapeworm

Point out that you can identify a species by its unique remedy for survival—morphological, behavioral.

Show how division of labor enables better maintenance of the seven life functions, hence better chances for survival of whatever phenomenon it is a part of (animal body or animal society). Discuss human division of labor as being most complex of all.

Emphasize the way in which division of labor is needed in direct proportion to the growing complexity of animal bodies and societies.

Show films and filmstrips that will reflect:

1. Animals that are controlled by environment
2. Competing waterbound animals
3. Migrating and hibernating animals
4. Competing land animals—natural enemies
5. Scientific and political man—modern farming, medicine, health laws, national defense, etc....all for cause of survival

Stress that lower invertebrates are those that have poor means for motion and locomotion, and that the absence of well-developed skeletons, muscles, and nervous systems implies poor facility for responding to environment, hence simple forms of life. But show how each has survived because of its own unique method.

It is suggested that study of the higher invertebrates be covered through pupil projects. Let the students "draw" for species on which they are to do research. Conduct this drawing when you begin the topic, so that research findings may be reflected as you discuss the first part in sub-topics A-F. Have the students follow regular project report forms (See introduction).

It would be wise to reproduce enough report forms for the entire <u>first</u> semester. Require each student to summarize his report on the chalkboard, and have the others record this information. Coordinate with other teachers in guiding these projects.

4. Roundworms
   a. Vinegar eel
   b. Trichina
   c. Hookworm

5. Segmented worms
   a. Earthworm
   b. Leech

6. Crustaceans
   a. Shrimp
   b. Crabs
   c. Crayfish
   d. Lobster

7. Arachnids—8 or more legs
   a. Spiders
   b. Mites and ticks
   c. Scorpions

8. Centipedes and millipedes

9. Insects—usually 6 legs

H. Life cycle of:

1. Housefly

2. Cicada

I. Social insects—ant and bee

Encourage the students to cover other species, but confine each student to one class. This will strengthen his command of that area and thereby his authority within the class of students.

In covering the life cycle, study the housefly, because its nearness and impact upon man, and the Cicada, because of its seventeen-year life cycle. The filmstrip "Life of a June Bug and Cicada" is a good aid in this discussion.

Direct student projects in pursuit of such questions as:

1. What is this animal's environment?

2. What is this animal's life cycle?

3. What is this animal's technique for survival?

4. How does this animal maintain the seven life functions?

5. What steps does man take to nurture or control this animal?

Have word lists prepared for this topic. Stress the word "metamorphosis."

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Reference Readings

Alexander, Gordon. General Zoology. Barnes, 1940.

Bartlett, Ruth. Insect Engineers: The Story of Ants. Morrow, 1957.

Beebe, William. Exploring with Beebe. Putnam, 1932.

Bronson, W.S. Grasshopper Book. Harcourt, 1943.

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Buchsbaum, R.M. Animals Without Backbones. University of Chicago Press, 1948.

Burton, Maurice. Curiosities of Animal Life. Sterling, 1959.

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Cooper, E.K. Silkworms and Science: The Story of Silk. Harcourt, 1961.

Cosgrove, Margaret. The Strange World of Animal Senses. Dodd, 1961.
Daniel, Hawthorne. The Inexhaustible Sea. Dodd, 1954.
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Duddington, C.L. Instructions to Young Zoologists. Sportshelf, 1961.
Earle, O.L. Crickets. Morrow, 1956.
Earle, O.L. The Octopus. Morrow, 1955.
Farb, Peter. The Story of Butterflies and Other Insects. Harvey, 1959.
Fenton, C.L. Insects and Their World. Day, 1956.
Gramet, Charles. Reproduction and Sex in Animal Life. Abelard, 1962.
Harpster, H.T. Insect World. Viking, 1947.
Hansman, L.A. Illustration Book of the Sea. Grosset, 1957.
Helm, Thomas. Monsters of the Deep. Dodd, 1962.
Hinton, Sam. Exploring Under the Sea. Garden City Books, 1957.
Hegner, Dorothy. Grasshoppers and Crickets. Crowell, 1960.
Hutchins, R.N. Insect Hunters and Trappers. Rand, 1957.
Swanson, C.P. Bees and Wasps. Maxton, 1959.
Williamson, Margaret. The First Book of Bugs. Watts, 1949.

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Audio-visual Aids

Films

1070	Ant City.....10 min.	332	Earthworms.....10 min.
6	Beetles.....11 min.	14	Butterflies.....11 min.
1525	Insects Are Interesting.....C..11 min.	232	Honey Bee.....11 min.
		M1857	House Fly.....17 min.
404	Life Cycle of the Mosquito.....12 min.	M2491	Spider Engineers...C..15 min.
		1690	Hydra.....10 min.
1755	Life on a Dead Tree...C..10 min.	M1693	Mitosis and Meiosis...17 min.
M2142	Secrets of the Bee World.....C..13 min.	1072	Eyes Under Water.....10 min.
		1869	Life in the Sea....C..11 min.
1068	Sea Zoo.....10 min.	367	Salt Water Wonderland .....C.. 9 min.
4	Beach and Sea Animals....11 min.		
2488	Characteristics of Plants and Animals.....C..10 min.	347	Sea Urchin.....10 min.
		L1472	Nature's Half Acre.C..32 min.

Filmstrips

FsG-2126 Living Matter--Series 7 (life cycle)
FsG-2137 Living Matter--Series 8 (osmosis, dormancy, tissues)
FsG-1131 American Insect Guide (four strips and manual)
Fs-658 Insect Pests and Disease
Fs-733 Shellfish of the Seashore

Transparencies

Tr-1019 The Earthworm
Tr-1022 The Grasshopper
Tr-1023 The Honeybee
Tr-1017 The Sponge
Tr-1020 The Clam
Tr-1018 The Coelenterates
Tr-1026 The Crayfish

TOPIC 3: VERTEBRATES

Textbook References

Living Things, pages 154-185; 396-397; expanded reading, pages 379-384.
Adventures In Science, pages 328-362.
Science 2, pages 251-255; 265-276.

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Content

A. Vertebrates
   1. Fish (pisces)
   2. Amphibians
   3. Reptiles
   4. Birds (avis)
   5. Mammals

B. Cold-blooded vertebrates

C. Warm-blooded vertebrates

D. Hibernating vertebrates

E. Animal diets
   1. Herbivorous
   2. Carnivorous
   3. Omnivorous

F. Carbon-oxygen cycle

G. Balance in nature
   1. Plant-animal interdependence
      a. Herbivorous animals
      b. Carnivorous plants
      c. Carbon, nitrogen cycles
   2. Natural enemies
   3. The "Biome"

Suggestions

Since the morphology and behaviors of the five classes of vertebrates are better known to the students, you should be able to enter directly into discussions of such questions as:

1. Where are fish eggs deposited and how are they fertilized?
2. Where are amphibian and reptile eggs deposited? How are they fertilized? In what other ways do amphibians and reptiles differ?
3. Which classes of vertebrates are cold-blooded? Which are warm-blooded?
4. In cold-blooded animals, which life functions are influenced most by climatic changes?
5. Why is it that fish, amphibians, and reptiles need no sweat glands? How do birds maintain constant body temperature? How do mammals? Why do pigs head for the nearest water hole on a hot day? (sweat glands only around the anus) Why do dogs pant on a hot day? (sweat glands on the tongue) Evaporating water absorbs heat.
6. How do birds and mammals keep warm?
7. Why are natural enemies usually carnivorous?
8. What are the distinctive morphological traits of vertebrate classes? What is each class's technique for survival? What is each species'?

H. How vertebrates survive

1. Capacity to fight

2. Ability to escape from enemies

3. Effective means of reproduction

4. Well-developed sensitivity
   a. The senses
   b. Brain capacity
   c. Rational man

5. Protection—skin, etc.

I. Difference between wildness and domestication

1. Wildness
   a. Selected environment
   b. Techniques for survival

2. Domestication
   a. Needs served by man
   b. Importance to man
   c. Survival based on traits valued by man

J. Fish and Game Commission

1. Supplying refuges
   a. Aransas Pass—winter refuge for whooping crane
   b. Maintaining a natural habitat

2. Stocking lakes

3. Regulating animal populations
   a. Hunting and fishing seasons
   b. Bounties
   c. Transferring stock to less populated areas

K. Occupations relating to animals

1. Forestry—forester

9. How does the "biome" work? (Note: A good way to make a biome is to have the student place a small fish or crawfish into a small-neck gallon jug half full of water, together with some sand and plant life, the leaves of which are at least partly above the water level. Cork the jug and seal with wax, then let it stand until signs of imbalance appear.

10. What are the social tendencies of the various vertebrate classes? Which are more inclined to form families and communities? Why? When? Where? How?

11. Which are the viviparous vertebrates?

12. Which vertebrates are most advanced? Why? What are the precise advantages of morphological traits such as four-chambered heart, feathers, hair, diaphram, sweat glands, and endoskeletons?

13. Why is environmental adaptation important to a particular animal? Is this not a lesson for man, to adapt to his social environment, to aid and cooperate for the sake of advancement and survival?

14. In what ways does man control his animal environment?

15. Which of all animals on earth present the greatest threat to man's survival?

16. Which vertebrates are most useful to man? Why? Is this usefulness a matter of economic importance? What does economic importance mean?

17. In what ways—other than economic—are vertebrates important? How is the snake important? Birds? Amphibians? Fish? Does this not point to man's greatest rival on earth—the insects?

2. Agriculture
   a. Farming and ranching
   b. Government agent
   c. Wholesale and retail jobs

3. Commercial hunting and fishing

4. Veterinary medicine

5. Teaching
   a. Agriculture
   b. Zoology
      (1) Physiology--functions
      (2) Ornithology--Birds
      (3) Ichthyology--Fish
      (4) Anatomy--structure
      (5) Embryology--prenatal development
   c. High School Science

6. Pest control

7. Animal keeper and trainer
   a. Zoo
   b. Pet shop
   c. Amusement
      (1) riding stable
      (2) circus

8. Society for the Prevention of Cruelty to Animals (S.P.C.A.) and other humane societies

18. What particular advantages are there in having a backbone? What is the relationship between the backbone and the nervous system, morphology, and bilateral symmetry?

19. What is the difference between the words "growth" and "development"? Why has the primitive shark survived the Ages?

20. What are some unusual mammals? (whale, bat, seal, dolphin, man)

21. Which of the occupations relating to animals would you prefer over the others? Why?

22. Why do we have laws protecting wild-life? Why do we have city health laws, concerning sewage disposal? The selection of meats and groceries? What are parasites?

23. What are some of the ancient beliefs concerning animal life? (Aristotle: that the housefly was a spontaneous product of the garbage pail) (Hair of horse's tail developed into an eel, if put into water)

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Reference Readings

Alexander, Gordon. General Zoology. Barnes, 1940.

Allen, R.P. The Giant Golden Book of Birds. Golden, 1962.

Andrews, R.C. All About Dinosaurs. Random House, 1953.

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Barker, Will. Winter-Sleeping Wildlife. Harper, 1958.

Bothwell, Jean. The Animal World of India. Watts, 1961.

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Chapin, Henry. The Remarkable Dolphin and What Makes Him So. Young Scott Books, 1962.

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Hylander, C.J. Animals in Fur. Macmillan, 1959.

Lavine, S.A. Wonders of Animal Disguises. Dodd, 1962.

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McClung, R.M. All About Animals and Their Young. Random House, 1958.

Mason, G.F. Animal Homes. Morrow, 1947.

Mellen, I.M. Wonder World of Fishes. Dodd, 1951.

Sanderson, I.T. Living Mammals of the World. Hanover House, 1955.

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Audio-visual Aids

Films

M2467	Frog Anatomy	C	17 min.	M2493	The Frog: A Familiar Amphibian	C	15 min.
1450	Snakes Can Be Interesting		10 min.	313	Snakes		11 min.
1074	Robbers Under Water		10 min.	1071	Beauties on the Beach		10 min.
1572	Bird Neighbors	C	10 min.	281	Birds of the Dooryard	C	11 min.
318	Birds in Winter	C	10 min.	453	Birds of the Woodlands	C	10 min.
1211	Bobolink and Bluejay	C	10 min.				

312 Five Colorful Birds...C..10 min.
1377 Mother Hen's Family: The Wonder of Birth.....10 min.
442 The Robin.....C..10 min.
1844 Robin Redbreast.....C..10 min.
287 Ruby-throated Humming Bird.....C.. 8 min.
233 Water Birds.....11 min.
M1654 Life in a Garden.....12 min.
1648 Life in the Desert.....11 min.
M2480 The Living Mammal.....C..17 min.
1076 Miracle of Life.....10 min.
M1756 Prehistoric Animals of the Tar Pits.....20 min.
2011 Grouse of the Grasslands.....C..10 min.
1742 Herons.....10 min.
1073 Mr. and Mrs. Canary.....10 min.
L1473 In Beaver Valley.....C..32 min.
1868 Big Animals of Africa.....C..11 min.
1743 Can Animals Think.....11 min.
237 Common Animals of the Woods.....11 min.
364 How Animals Defend Themselves.....10 min.
365 How Animals Eat.....10 min.
366 How Animals Move.....10 min.

Filmstrips

Fs-1146 Animals and Birds of Africa
Fs-923 Animals of Long Ago
Fs-1707 Careers in Science
Fs-503 Helping the Birds
Fs-502 How Birds Serve Man
Fs-501 Migration of Birds
Fs-498 Structure of Birds
Fs-730 Fresh Water Turtles and Fish
Fs-729 Fresh Water Shellfish and Amphibians
Fs-731 Keeping an Aquarium
FsG-2136 Man's Use and Control—Series 7
Fs-804 Common Animals of the Woods
Fs-805 The Horse (training of)
Fs-922 How Life Began
Fs-704 Reproduction Among Mammals (pigs)
Fs-499 Adaptation of Birds
FsG-1129 American Birds Guide (4 strips)
Fs-1259 Birds of Harbor and Seashore
Fs-1260 Birds of Villages and Towns
Fs-2237 From Egg to Chick
Fs-1255 John James Audubon
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